

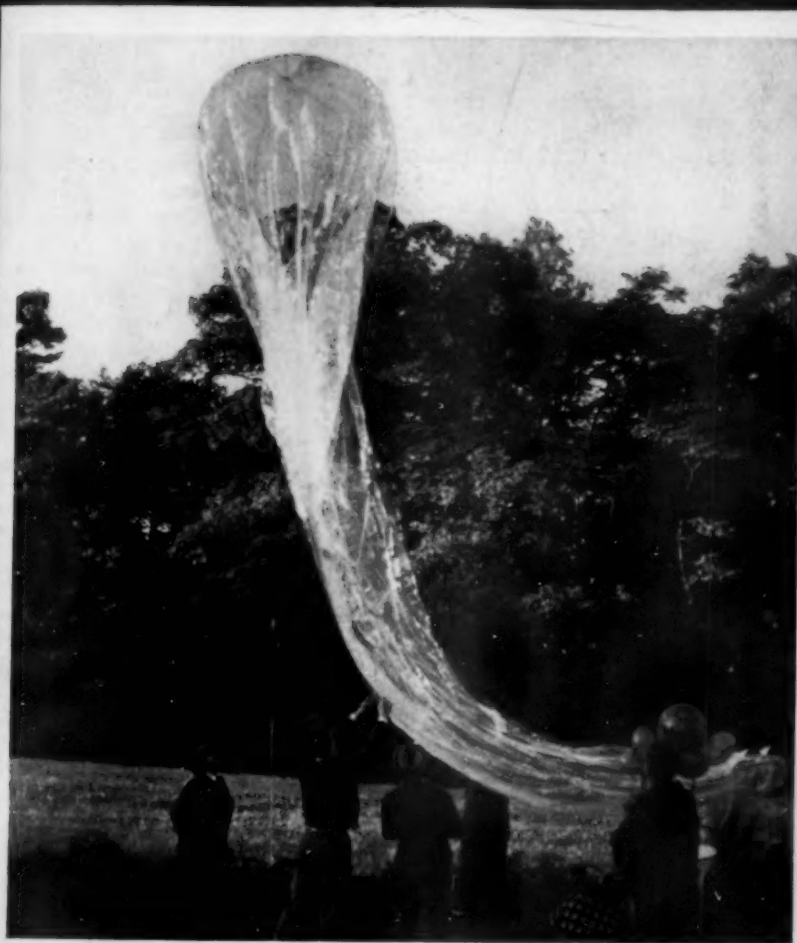
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JUL 7 - 1936

# SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •



JULY 4, 1936

Stratosphere Craft

See Page 12

A SCIENCE SERVICE PUBLICATION

## SCIENCE NEWS LETTER

Vol. XXX

No. 795

The Weekly Summary of



## Current Science

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## DO YOU KNOW?

Genuine mahogany grows in the United States only in far southern Florida.

Carpet beetles were brought to the United States from Europe about a century ago.

Opium poppies grown experimentally in Denmark on land formerly planted in barley have yielded high morphine content.

Italian rubber manufacturers are working experimentally with artificial rubber and have exhibited some of their products.

A London hospital has constructed a pollenarium in which to study grass pollens that are used in treating hay fever.

Suspected of having a missing door key concealed in its interior, a valuable stork in an Illinois zoo was recently fluoroscoped and radiographed, but no key was found.

New houses can be made resistant to termites by adding about two per cent to construction cost.

Thomas Jefferson when President lent his support to establishing smallpox vaccination as a public health measure in this country.

Philadelphia finds that its planetarium is the second most popular sight for visitors to the city, outranked only by the Liberty Bell.

Scientists are experimenting with fruits grown commercially in Great Britain to find more ways of using fruits in wines, summer drinks, and other products.

Dutch engineers are trying out a new system of constructing an ice skating rink: brine is admitted to the basin in streams rather than through pipes, powdered metal combined with binding cements is squirted over the brine, and then water as a top layer forms an ice sheet.

## WITH THE SCIENCES THIS WEEK

Most articles are based on communications to Science Service or papers before meetings, but where published sources are used they are referred to in the article.

## AERONAUTICS

What honor has been given to two stratosphere voyagers? p. 6.

## ASTRONOMY

How do the planets help to make their own weather? p. 9.

Why has Saturn lost his rings? p. 8.

## CHEMISTRY

Can molecules be "graded" for size? p. 9.

Can the bitterness be removed from quinine? p. 8.

## CHEMISTRY-ANTHROPOLOGY

Can scientists today learn what were the blood types of men in the Old Stone Age? p. 6.

## CONSERVATION

What effect does air in the soil have on flood waters? p. 13.

## ECOLOGY

Does the shade given by trees indicate their ripeness for timber? p. 14.

## ENTOMOLOGY

Where is the battle against the grasshoppers raging? p. 8.

## GENERAL SCIENCE

Should scientific investigations always have immediate usefulness? p. 15.

## GENETICS

Is cancer due to a single mendelian factor in the heredity? p. 9.

## INVENTION

What invention did Abraham Lincoln patent? p. 3.

## MEDICINE

What new treatment for diabetes has been developed by one of the discoverers of insulin? p. 4.

Why is it a good idea to have moles removed? p. 9.

Will a powerful electric shock save a man from death? p. 7.

## METEOROLOGY

Is a lightning flash continuous? p. 8.

## OCEANOGRAPHY

Does the Hudson river valley go out to sea? p. 6.

Where is an 18th century royal dwelling to be used for scientific research? p. 7.

## ORNITHOLOGY

Which eagle is the national bird of the United States? p. 14.

## PHYSICS

Does it cost much to send a balloon to the stratosphere? p. 12.

How powerful will be the huge X-ray tube now under construction? p. 5.

For what practical purpose will the new University of Michigan atom smasher be used? p. 5.

## PHYSICS-MEDICINE

What may be the advantage of neutron rays for biological study? p. 4.

## PHYSIOLOGY

Can human bone marrow be grown outside the body? p. 7.

Why is it important to measure the pressure of bile in the human body? p. 8.

## SAFETY ENGINEERING

Is it safer to ride in an automobile or an airplane? p. 10.

INVENTION

# Present U. S. Patent System Founded 100 Years Ago

More Than Two Million Patents Have Been Issued In That Time; Secretary Ickes Has One for a Dahlia

BESIDES the 160th anniversary of the Declaration of Independence, Uncle Sam has another big event in his history to celebrate this Fourth. It is the 100th birthday of the establishment of the modern American patent system.

While the Declaration of Independence, unprecedented in the history of nations, gave political freedom, the establishment of the modern American Patent System, also without precedent in all history, gave, through the inventive genius which it stimulated, freedom of another kind—freedom from drudgery in the home, industry, office and field.

When President Andrew Jackson affixed his signature to the Act of July 4, 1836, creating the American way of granting patents, the telegraph, typewriter, sewing machine, dynamo, auto, airplane, telephone, radio, and electric refrigeration were, of course, unknown. All these and thousands of other inventions which have increased our comfort, health, convenience and added to human happiness were fostered under this system. To it is attributed the astonishing industrial progress of the U. S. and its number one position among nations in industry.

## Many Inventors

In fact, under it Americans have become the most inventive people on earth. Within 100 years some 2,045,000 U. S. patents for inventions have been granted, well over twice that granted by any other country. Probably well over 100,000 applications are pending before the office.

The granting of patents today is a big business. Back in 1836 Patent Office receipts were \$29,289. In 1935 they had jumped to \$4,264,874. The Patent Office is one of the few government bureaus which does not cost the government a cent.

While July 4 marks the 100th anniversary of the enactment of the Patent Act which gave us the modern system, this does not mean that the Federal Government had not granted patents before 1836. Inventors were busy from the very

early days of the colonies, before there was any central government.

Just as now, they wanted exclusive rights to their inventions, and petitioned the colonial legislatures to pass special acts granting them patents or a monopoly.

A number of colonies granted patents for inventions, but since the grant extended only within the territory of the state, the inventor had to seek separate protection in each colony, an expensive and unsatisfactory procedure.

## Patents Before 1836

But what was the best way out? Between the Philadelphia meeting of the nation's founding fathers to draw up the Constitution and the final establishment of the present patent system in 1836 the patent laws of the land went from one extreme to the other.

After the first Patent Act of 1790 each patent was signed by the president, the secretary of state and the attorney-general, with the secretary of war also serving on the patent-granting committee.

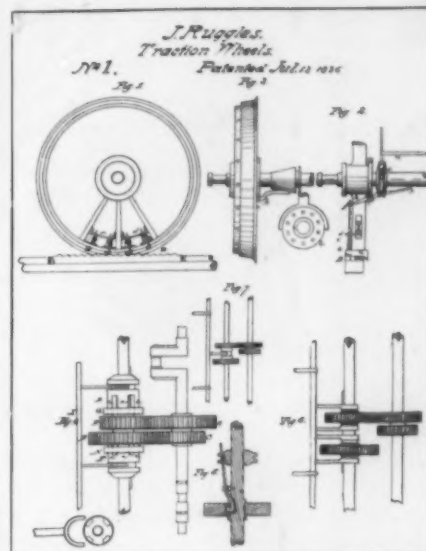
Thomas Jefferson, as secretary of state, made life in 1790 miserable for prospective inventors. Not only did he have inventive ability himself but he had high personal standards of what constitutes invention. Only three patents were granted in the first year! And in three years of existence, only 57!

The resulting howls from this almost dictatorial control reached the ears of Congress and in 1793 the nation's legislators went to the other extreme and made the granting of patents, in effect, only a mere registration with an accompanying \$30.

In the ensuing craze people patented nearly everything in use, new or otherwise. Many people had patents without assurance that they were valid.

## Senate Inquiry

Because the law failed to accomplish what it was intended to do, Senator John Ruggles, of Maine, introduced a resolution in the Senate setting up a three-man commission to investigate the



U. S. PATENT NO. 1

patent situation. On April 28, 1836, it had its report all ready. A deplorable state of affairs was revealed.

Largely through Senator Ruggles' efforts the law of July 4, 1836, was enacted. The system of patent law and practice which it established was without precedent in all history. For the first time in any country, a system was set up which protected the rights of inventors in an intelligent, scientific and adequate way. The patent grant was given a prima facie standard of validity.

## Separate Bureau

The Patent Office now became a separate bureau in the Department of State, headed by a Commissioner of Patents. Patent fees were \$30 for citizens of the United States, but for Great Britain \$500, because Great Britain charged American inventors that much to get a British patent. There were retaliatory tariffs in the old days, too. Other foreigners paid \$300.

The first patent under the Act of July 4, 1836, Patent No. 1 in the new series, was granted to John Ruggles on July 13, of the same year. This is the same John Ruggles who was so instrumental in obtaining passage of the law. His invention was for a "Locomotive Steam Engine for Rail and Other Roads," which could get up over hills and inclines. The locomotive was provided with special wheels that had pins which gripped a special saw-toothed rail and prevented the wheels from slipping. By the end of 1836, the Patent Office had granted its 109th patent.

Fifty years after the granting of patent number one under the new system, found business in the Patent Office

jumping to such an extent that 390 patents were granted for the week of July 13, 1886.

### 50th Anniversary Patents

On that 50th anniversary date, Elihu Thomson, one of the champion inventors of the country with a record of some 700 patents to his name, received a patent for a socket for incandescent lamps, which is the forerunner of that used today in automobile headlight lamps. Ottmar Mergenthaler, inventor of the linotype machine, was granted patents for improvements in casting type.

Jumping another 50 years to 1936, the Patent Office is granting some 800 patents each week, covering every phase of scientific endeavor. On April 30, 1935, it granted patent No. 2,000,000. Seventy-five years had passed before patent No. 1,000,000 was granted in 1911, but only 24 years before No. 2,000,000 was issued.

Applications for patents come from every country in the world. All applicants now pay the same fee and Britishers are no longer charged \$500. Everyone, it seems, has a bit of Edison in him. Abraham Lincoln obtained a patent for buoying boats, John Jacob Astor patented a street sweeper, and Secretary Harold Ickes has a patent on a dahlia.

Some 15,000 women have been granted patents. A woman patented the modern paper bag, and a Mrs. Martha J. Coston is the inventor of a signal flare used by seamen all over the world. One woman, the "Lady Edison," has some 50 patents to her name.

In a group of patents just granted, you will find inventions on television, a device for controlling the ionic content of air, a car which speeds over tracks and instantly detects flaws in rails, more efficient electron tubes, and devices for cracking oil which increases the yield of gasoline.

In one respect the Patent Office conducts a big ten-cent store, selling for this sum duplicate copies of the 2,040,000 patents on file. Some 7,000,000 of these so-called "soft copies" are sold yearly.

All of which means that Uncle Sam has something really worth while to celebrate in this centennial of the modern patent system. In one of his speeches made when he was dedicating a library, Abraham Lincoln said that the establishment of the American Patent System was one of the three greatest events in world history.

*Science News Letter, July 4, 1936*

### MEDICINE

## Diabetes Treatment Improved By New Insulin Compound

**T**HE advantages of protamine insulin over ordinary insulin in the treatment of certain cases of diabetes were proclaimed by one of the co-discoverers of insulin, Prof. C. H. Best of the University of Toronto, at the meeting of the Canadian Medical Association, at Vancouver.

The new kind of insulin was developed by Danish scientists. It was not intended to supplant ordinary insulin in cases of diabetes which can be satisfactorily controlled by insulin alone, but was found a valuable adjunct to insulin in treating cases of severe diabetes. Protamine insulin is relatively insoluble and tends to be absorbed slowly and over a longer period of time than ordinary insulin. Consequently its blood sugar lowering effect lasts longer—twice as long, in fact.

"The work of the Danish group on protamine insulin has been abundantly

confirmed," Dr. Best said. "Various groups of clinicians in Boston, Toronto, London, and Rochester, Minn., have found that the duration of insulin action is much extended when insulin is combined under appropriate conditions with protamine."

Dr. Best and his associate, Dr. Robert Kerr, found that dogs having no insulin-producing pancreas tissue could be kept free from symptoms of diabetes by one injection of protamine insulin daily. At least two injections of regular insulin are needed to accomplish this result. The fluctuations observed in the amount of sugar in the blood when regular insulin is used are avoided with protamine insulin.

The use of protamine or some even more satisfactory agent will make it possible, Dr. Best said, to maintain certain diabetic patients in a much more normal condition.

*Science News Letter, July 4, 1936*

### PHYSICS-MEDICINE

## Hope Neutron Rays May Prove More Efficient Than X-Rays

**E**XPERIMENTS on the ability of the new neutron rays of science to produce biological changes in living organisms show that they are much more efficient than X-rays, Dr. Raymond E. Zirkle, Johnson Foundation for Medical Physics at the University of Pennsylvania, told the meeting of the American Association for the Advancement of Science.

The ultimate hope of the investigators, Dr. Zirkle revealed, is that the neutron rays will be more destructive to tumorous tissue than to normal tissues. This differential destructiveness is possessed to a certain extent by X-rays, but if the neutron should prove to have it to an even greater degree, it would thereby be a much more potent radiation with which to attack cancer.

"The results to date," he declared, "do not yet justify the prediction of such an extremely fortunate outcome, but are nevertheless distinctly encouraging."

The neutron—one of the fundamental building blocks out of which atoms are built—was only discovered in 1932. Even yet the sources for creating neutron beams for biological study are so weak that only beams of low intensity can be used.

But the encouraging thing, Dr. Zirkle said, is that the effectiveness of neutrons for any certain amount of their ionizing effect (which is the way in which all such rays act on biological material) is greater than that of X-rays. The relative effectiveness has been found to be, for different biological materials, from three to ten times in favor of the neutrons.

Moreover, and still more encouraging, the neutron-X-ray ratio of effectiveness is not the same for all living tissue. "This is of tremendous importance," said Dr. Zirkle.

The reason, he added, is that scientists not only want some ray for their

cancer research which will destroy all tissue more effectively than X-rays, but they want a radiation which will be more destructive to tumors than to normal tissue.

If it should prove that neutrons are ten times as destructive as X-rays to tumors and only three times as destruc-

tive to normal tissue, then the new neutron rays would be a tremendously more beneficial radiation to use in cancer research. This fortuitous situation cannot now be hailed with certainty, Dr. Zirkle indicated, but the results so far are encouraging.

*Science News Letter, July 4, 1936*

## PHYSICS

## 1,200,000-Volt X-Ray Tube Is Now Under Construction

**P**RODUCTION of medical radiation greater than all the refined radium in the world is one of the advantages claimed for the super-X-ray machine being constructed by the Kelley-Koett Company, Covington, Ky.

It is estimated that it would cost \$100,000,000 to produce sufficient radium to equal the quantity of radiation available in the super-X-ray.

The machine, the largest in the world, will be used in the treatment of cancer. Four patients can be treated at one time by use of the 1,200,000-volt apparatus. It is now being built at a cost of approximately \$75,000, for the Miller Hospital, St. Paul, Minn.

The 27-foot tube, in which electrons will bombard a gold electrode to create the radiation necessary for cancer treat-

ment, has already been completed. Tubes in ordinary X-ray machines are dwarfed when placed beside the gigantic "medical battlefield."

When complete the machine will be 35 feet high, 24 feet wide, 33 feet long. Ordinary X-ray machines are 100,000-volt equipments. A few 800,000-volt and 400,000-volt machines are in use.

Not only will the radiation of this new giant of the medical world be greater than that of the world's supply of refined radium, but the machine's radiation will have greater penetrating power. The tube itself is protected with four inches of lead to prevent the radiation except where it is desired.

Three feet of concrete will separate the tube from the operator when it is

installed, to protect him from radiation.

The object of the super-ray is to penetrate into the body to treat cancers which cannot be treated at the present time because of burns which would result. The great penetrating power makes treatment possible where serious X-ray burns would result on the skin with less penetrative machines.

The target of the tube, or the X-ray producing electrode, will be of gold, five inches in diameter and one-sixteenth of an inch thick.

Gold is used because of its high atomic weight. The electron streams bombarding it will produce a more penetrating radiation than with metal of less atomic weight. Ordinarily, tungsten is used for such targets. The tube itself is of indestructible porcelain and metal.

*Science News Letter, July 4, 1936*

## PHYSICS

## World's Largest Cyclotron At Michigan University

**N**INETY-FIVE tons of iron and copper form the giant electro-magnet which is the foundation of the world's largest cyclotron, now under construction at the University of Michigan. Alteration of atomic structure, already accomplished with other cyclotrons, may be carried much farther with the Michigan apparatus. It will have practical application in the preparation of radioactive salts for use in the treatment of cancer, in addition to offering an opportunity for scientific investigation of the composition of atoms.

The magnetic field which the electro-magnet produces, the greatest integrated field ever developed, causes the rotation of ions, electrified particles, introduced into the duants, or halves, of a flat cylinder. The speed of these ions is accelerated by a 30,000-volt impact each time they cross the dividing space between the duants.

In 200 revolutions, according to Dr. James M. Cork, who is directing the construction of the cyclotron, the ions attain a speed equal to that which would result from an impact of 10 to 12 million volts. As an ion accelerates, its orbit grows larger, until it reaches the outer edges of the duants, where a deflecting blade diverts it against the desired target. This collision causes the breakdown of the atom through the disruption of its nucleus.

*Science News Letter, July 4, 1936*

Cherries are considered a good source of vitamin C.



**ATOM SMASHER**

Dr. J. M. Cork, University of Michigan physicist, stands beside the newest of all cyclotron equipment which scientists use to smash atoms and probe the secrets locked in atomic nucleus. Largest in the world, including even the famous apparatus of Prof. E. O. Lawrence at the University of California, the device weighs over 95 tons.

## CHEMISTRY-ANTHROPOLOGY

## Chemistry Makes Dry Bones Reveal Ancients' Blood Types

**B**Y AID of delicate chemical tests that sound like magic, dry bones of Egyptians who lived 3,300 years ago can be made to give up important secrets regarding types of blood that once flowed in their veins.

The experiment, pronounced successful, is expected to open up a "vast new field of research" enabling science to probe long-lost chapters of man's racial history.

Announcement of the tests was made before the American Association for the Advancement of Science by Dr. P. B. Candela, Brooklyn physician. In his tests, Dr. Candela used skeletons of Egyptian women who lived in the days of Egypt's eighteenth dynasty, 1500 B.C., now in collections of the Brooklyn Central Museum.

The four types of human blood, which have become familiar to the public through their use as evidence in court cases to test paternity, have value in scientific study of races, less widely known to the public.

It has been possible, said Dr. Candela, to prepare blood group maps of the world showing that various races in different parts of the world are mainly of one blood type or another. American Indians, Celts, and Basques belong predominantly to type two. Groups as dissimilar as Hindus, Pata-

gonians, and Amazon tribes are classed by blood mainly as type three.

That this evidence points backward toward some significance in the early history and origin of human races was realized. But to trace that significance required evidence about blood types of ancient men dead thousands of years, and this information seemed lost beyond recall.

Recent tests, however, have shown that mummified flesh of Egyptians and Indians can be made to reveal blood types. Dr. Candela's research extends the technique to dry bones, thus opening up the way for science to learn the blood traits of early men even in the Old Stone Age.

The method of using bone to reveal blood type involves pulverizing a portion of bone and mixing some of it with diluted serum of each of two blood types. The filtered fluid is later tested against red blood cells of the opposite blood type, and by observing whether the red cells clump together or not, the blood type can be detected.

The majority of the Egyptian women whose bones were thus tested belonged to blood type three. Dr. Candela said that investigators who tested the dried flesh of Egyptian mummies had also identified these ancient people as of blood type three.

*Science News Letter, July 4, 1936*

## OCEANOGRAPHY

## Three Vast Submarine Canyons Found Off Atlantic Coast

**D**ISCOVERY of three vast submarine canyons, hitherto unknown to science, is reported by Prof. Francis P. Shepard, who has just returned from a cruise on the U. S. Coast Survey ship *Oceanographer*. Prof. Shepard's participation in the survey was assisted by a grant from the Geological Society of America.

The canyons are cut deep into the sea bottom off the Middle Atlantic region of the United States. They lie to the southwest of the great submarine Hudson Canyon, which continues the Hud-

son valley far under the ocean from the mouth of the present Hudson river.

The greatest depth of the floors of the three new-found canyons is 7,000 feet below sea level. Their walls rise above this level 1,000, 1,500, and 2,000 feet respectively.

The deepest of the three is the southernmost. This canyon is located approximately off Toms River, N. J., and cuts back into the continental shelf for about three miles. The other two terminate headward below the shelf margin.

All these canyons extend directly

down the continental shelf slope in the direction which would be expected of streams if the sea level were lowered, and their shapes are decidedly those of stream-cut canyons.

Prof. Shepard has plotted the 4,700 soundings of the recent Hudson Canyon survey on a large scale. He states: "This is the most complete deepwater survey ever made and probably the most successful of the surveys to date. The canyon is much straighter than previously supposed, being practically identical in character with the canyons off Georges Bank in having a maximum wall height of 4,000 feet; but the hundred-fathom curve is bent shoreward sixteen miles as compared to thirteen for the largest of the Georges Canyons. The walls are not quite as deep in the case of the Hudson Canyon. The bottom declivity is fairly uniform but shows an increase between 3,500 and 4,500 feet, which is probably due to the outcrop of a harder layer along the canyon course.

"Inside the canyon, as was known previously, a valley only about sixty feet deep extends almost into New York. This shallow valley is only a few feet deep where it joins the head of the canyon. It was probably caused by a small lowering of sea level rather than by the great emergence which is implied by the deep canyon, which cuts the continental slope of the world.

*Science News Letter, July 4, 1936*

## AERONAUTICS

## Stratospherists Honored By Mackay Trophy Award

**T**HE MACKAY Trophy, one of the most prized of all awards that airmen can win, was given to Capt. Albert W. Stevens and Capt. Orvil A. Anderson, U. S. Army Air Corps, commander and pilot respectively of Explorer II, balloon of the National Geographic Society-Army Air Corps Stratosphere Expedition. The award was made in recognition of their record-breaking ascent of last Nov. 11, to a height of approximately fourteen miles.

The Mackay Trophy is a great silver bowl on a pedestal, with names of former prizewinners engraved on plaques on the base. The award was established in 1912, and has been won by such Army aces of the air as Rickenbacker, Maitland, Macready and Doolittle. Award is limited to officers in the Army Air Corps.

*Science News Letter, July 4, 1936*

Opossums hunt food mainly by their sense of smell.

## PHYSIOLOGY

# Glass Doubles for Bones to Permit Growth of Marrow

WITH glass apparatus doubling for the bones of the body, human bone marrow has been grown in the laboratory for the first time in quantities sufficient to permit studies of the blood and metabolism.

The complicated apparatus for growing this important human tissue outside the body is described by Dr. Edwin E. Osgood and Alfred N. Muscovitz, of the University of Oregon Medical School, Portland (*Journal American Medical Association*, May 31). The report of their work recalls the fact that it is not quite a year since Dr. Alexis Carrel and Col. Charles A. Lindbergh reported their experiments at the Rockefeller Institute, New York, in which they devised a glass apparatus for growing living glands outside the body.

The apparatus for growing bone marrow gives promise of solving important problems concerning changes in the blood and bodily tissues. The red marrow of bones produces the red blood cells, so it is likely that the new apparatus may aid in the study of anemia in which there is a breakdown in red blood cell production.

Construction of the marrow-growing apparatus is complicated; the parts are chiefly of glass. Most important of the features is a semi-permeable membrane separating the culture from the main

volume of medium. This membrane permits nourishment from the surrounding medium to reach the culture and allows waste products to diffuse out as they accumulate. Because of this equilibrium, analysis of the outflowing medium gives a good indication of conditions in the culture.

"The method appears to offer sufficient promise to justify a preliminary publication with the hope that other investigators may aid us in realizing as rapidly as possible its full potentialities," Dr. Osgood and Mr. Muscovitz declare in describing the invention. A grant from Eli Lilly and Company, Indianapolis, aided the venture.

*Science News Letter*, July 4, 1936

## MEDICINE

## Electric Counter-Shock Saves Man From Death

PHYSICIANS and surgeons are viewing with profound interest the report at the American Institute of Electrical Engineers' convention that an Italian, stabbed in a fight and about to die on an operating table, was brought back to life when the surgeon applied a counter-shock previously given animals in experiments to revive them after suffering an electric shock.

Dr. William B. Kouwenhoven, Balti-

more, Md., assistant dean of the school of engineering, Johns Hopkins University, told how a surgeon, while sewing up the Italian's heart, saw from the fibrillation of the organ that he would die, and gave him an electric counter-shock.

The surgeon had previously visited the Hopkins laboratory. It took two days for the researchers there to convince him by experiments on animals that counter-shock is effective in reviving the fibrillating heart.

The surgeon, whose home city and name were not disclosed, previously skeptical but convinced by actually making experiments in the Hopkins laboratory, is believed to be the first man to apply the counter-shock principle to reviving a human being.

The Italian's slashed heart started to flutter when the surgeon commenced to sew the wounds. The touch of the needle had started ventricular fibrillation. The regular heart beat ceased and circulation stopped. There was but one way for the surgeon to save the man. Without hesitation he shocked the patient. The reaction was similar to that of experiments on animals shocked and counter-shocked. The large current locked the muscles of the heart and when the circuit was opened the heart started to beat in regular rhythm, the fibrillation completely gone.

*Science News Letter*, July 4, 1936

## OCEANOGRAPHY

## Eighteenth Century Castle Now Devoted to Science

CHARLOTTENLUND Castle, 18th century royal residence near Copenhagen, is to become the headquarters of the International Oceanographic Research Commission. Modernizing the castle for this purpose will cost about 350,000 crowns, or \$78,000. The Danish government will contribute 60 per cent and the Carlsberg Foundation the rest.

The main building, in three stories, will be used for laboratories and the stable building (which is more like a villa) will serve jointly as an exhibition hall and rooms for the scientists connected with the Institute.

Private initiative is also planning the building of a large aquarium in connection with the Institute. Money for this purpose has been donated by the Danish engineer, Mr. Hojgaard. The aquarium, as well as the large private park surrounding the castle, will be open to the public.

*Science News Letter*, July 4, 1936



CASTLE OF RESEARCH

## ASTRONOMY

**Saturn's Rings Temporarily Vanish; Turned Edge On**

**T**HE RINGS surrounding the planet Saturn have now vanished from sight. But they have not been annihilated. In the later part of the summer they will be visible again, as a bright line crossing Saturn's disk, and extending to each side.

Though the diameter of the outer ring is 166,920 miles, and the entire system has a breadth of 37,570 miles, it is extremely thin, probably not more than ten miles in thickness. Saturn is so far away from the earth, about 793,000,000 miles on the average, that the greatest telescopes can hardly show them when we are exactly in their plane, as we were on July 1. The planet makes a complete circuit of the sun every 29½ years, and twice in this period the rings are presented to us exactly on edge. Between these times we see their northern or southern sides.

The rings of Saturn are not solid, but consist of a vast swarm of tiny moons, so close together that from this distance they appear as one mass.

*Science News Letter, July 4, 1936*

## ENTOMOLOGY

**Grasshopper Menace Grows In the Western States**

**G**RASSHOPPERS, plus failure to act on the part of Western state governments, have confronted the wheat-growing region beyond the Mississippi with a very serious threat, added to the already existing crop shortage due to the drought.

Last fall the bureau of entomology and plant quarantine, U. S. Department of Agriculture, found unusually large numbers of grasshopper eggs in the soil of the Plains and western Prairies. At that time the scientists warned the various state governments concerned, so that stores of poison bait might be ready when the insects should hatch and begin crawling this spring. Without exception, the state governments did nothing.

Now the grasshoppers have developed almost to the point where they have wings and begin flying in hordes. The Western states, alarmed, asked Congress for aid, since their legislatures had adjourned and there was no way of providing funds to meet the emergency which their inaction had permitted to arise. In its closing hours, Congress pushed through a joint resolution transferring a quarter of a million dollars from a chinchbug war fund not imme-

diately needed. Even with the speediest possible action, there is considerable doubt whether disaster can be averted.

Furthermore, the sum made available is estimated to be only about one-third of what would be needed for a really effective fight against the 'hoppers. The bureau of entomology and plant quarantine was not consulted either as to the desirability of using Federal funds for this purpose or regarding the adequacy of the amount or the timeliness of action. They are rather in the position of Gallieni's "taxicab" army before Paris in 1914: hastily mobilized, insufficiently munitioned, yet expected to stem the oncoming hordes in gray.

*Science News Letter, July 4, 1936*

## PHYSIOLOGY

**First Direct Measure of Bile Pressure Reported**

**P**ROBABLY the first two reports ever published of direct observations and measurements of pressure in the common bile duct of man are now available. (*Journal of the American Medical Association*, June 27.)

Dr. Harold A. Kipp of Pittsburgh operated on a man 78 years old and formed a communication between the gall bladder and the stomach. With a manometer he measured the variations in bile pressure in inches of normal salt solution, and found that laughing, coughing and even standing up influenced the flow of bile.

Three physicians from Rochester, Minn.—Dr. John M. McGowan and Dr. Winfield L. Butsch of the Mayo Foundation and Dr. Waltman Walters, surgeon—with the cooperation of their patients showed that there is an increase in the pressure within the common bile duct after the gall bladder has been surgically removed.

What is of greater significance to all surgeons and their gall bladder patients is the discovery by the Rochester doctors that morphine, the old standby for the colic that sometimes follows removal of the gall bladder, actually makes worse the condition that causes the pain.

"Of course, the pain disappears following administration of morphine just as it would if a black-jack had been employed; the sensory part of the brain ceases to function but the intraductal pressure rises," says the journal's editorial comment on the discovery.

Instead of morphine, the Rochester surgeons recommend prescribing a nitrite. The pressure within the common bile duct then drops and pain ceases.

*Science News Letter, July 4, 1936*

**IN SCIENCE**

## METEOROLOGY

**Lightning Becomes Star In Scientific Movie**

**L**IKE a nail gradually piercing a wooden board step by step under the impact of a carpenter's hammer, lightning strokes start from the clouds and finally reach the earth.

This "blow by blow" description of a lightning bolt coming to the earth was secured from a motion picture study made by scientists from the University of New Mexico and the University of Virginia.

Prof. J. W. Beams and Drs. L. B. Snoddy and E. J. Workman made studies of lightning strokes near Albuquerque, N. M. Using cameras they found that the first flash extended half way from the cloud to the earth. A second one followed the path of the first but went six-tenths of the way, while a third traveled seven-tenths of the distance between cloud and ground. The fourth flash reached all the way and struck the earth. Four other flashes from the cloud to earth followed at short intervals. Successive flashes occurred one hundredth of a second apart.

*Science News Letter, July 4, 1936*

## CHEMISTRY

**Inventor Patents Way to Make Quinine Tasteless**

**T**HAT bitter, shudder-creating taste of quinine is claimed not to be present in a new quinine compound for which a U. S. patent (No. 2,039,414) has just been granted to Max Hoffer, of Basel, Switzerland.

The inventor not only says that it is tasteless but also claims that it has no after taste.

The man-made quinine substitute is an entirely new chemical, made by combining quinine with a naphthalene compound. Naphthalene itself is familiar as the common moth balls or moth flakes. In the naphthalene compound there is present a chemical radical related to acetic acid, a substance present in vinegar. The chemical union between the quinine and the naphthalene compound takes away quinine's bitter taste, states the patent.

*Science News Letter, July 4, 1936*

# THE FIELDS

## MEDICINE

### Remove Moles to Avoid Cancer, Surgeon Advises

**B**BROWN or reddish moles on the skin should be removed before they give signs of trouble, in order surely to prevent subsequent cancer. This advice appears in a report by Dr. Dean Howard Affleck, of the surgical pathological laboratory of the Johns Hopkins Hospital and University, Baltimore (*American Journal of Cancer*, May).

Not all moles develop into cancer. In the hundreds of cases reviewed by Dr. Affleck no cancers developed in hairy moles. However, there is no way of distinguishing in advance between moles that will turn into cancer and those that will not. Those moles located in areas subject to injury and irritation are more prone to malignant change.

Once the process has developed to the point where the patient notices a change in the mole—enlargement or bleeding—it is almost always too late for treatment to succeed, Dr. Affleck finds. The only hope for the present, he concludes, seems to lie in removal of moles before they give trouble, particularly those that are subject to constant irritation.

*Science News Letter*, July 4, 1936

## ASTRONOMY

### Planets Help Make Weather By Influence on Sunspots

**I**F SUNSPOTS influence the course of weather on the earth (and presumably also on other planets) the planets in their turn influence the formation of sunspots, and thus indirectly their own weather events.

A statistical study of correlations between the positions of the three planets nearest the sun—Mercury, Venus, and earth—and the numbers and positions of sunspots has been made by Dr. Fernando Sanford of Palo Alto. Dr. Sanford has reported his results through the Smithsonian Institution, whose secretary, Dr. Charles G. Abbot, has been a leading investigator into the question of a possible connection between sunspots and weather.

An apparent hookup between planetary positions and sunspots was first no-

ticed by an English astronomer, Mrs. A. S. D. Maunder, about thirty years ago. Mrs. Maunder noted the curious fact that sunspots apparently formed in larger numbers on the side of the sun opposite the earth than they did on the side we can see.

Dr. Sanford has extended this correlation study to include the two planets that are still nearer the sun, and finds that they, too, seem to shove the sunspots around the sun to the opposite side. When any two of the three planets are in line, the influence seems to be even more pronounced than it is for a single planet.

Dr. Sanford suggests that electrical influences may hold the key to the puzzle. Sun, moon and earth are known to be negatively electrified. Presumably the other planets are electro-negative also. It is an axiom of electrical physics that like charges repel. Since sunspots are enormous electrical "storms" on the sun's surface, Dr. Sanford offers the hypothesis that the planetary charges act across intervening space to "push" these centers of solar electrical activity away.

*Science News Letter*, July 4, 1936

## CHEMISTRY

### Chemist Sorts Molecules As Factory Grades Peas

**I**T IS NOW possible for the chemist to sort out molecules, as a canning factory grades peas by passing them through sieves, by using cellulose membrane of the kind employed to wrap cigarettes.

How the "holes" in transparent cigarette wrapping material can be varied in size to allow such sorting was described by Prof. James W. McBain and Dr. R. F. Stuewer of Stanford University before the Thirteenth Colloid Symposium of the American Chemical Society.

"The holes," said the scientists, "may be adjusted smaller and smaller so that it is possible to put a solution of sugar or of salt or milk through and get only pure water."

Application of the molecule sorting, it was indicated, is in finding out how far certain molecules in a solution exist independently of one another, or whether some are in chemical combination.

"In a solution of pectin, which is the basis of most of the preparations which the housewife uses for making jellies, it is found that the colloidal particles of pectin contain one-third of their weight of molecules of water," the scientists reported.

*Science News Letter*, July 4, 1936

## GENETICS

### Cancer Heredity Not Due To Single Mendelian Factor

**T**AKING issue with Dr. Maude Slye, famous University of Chicago woman scientist whose research on cancer through the inbreeding of mice has been internationally acclaimed, Dr. Clarence Cook Little has published his most recent findings on heredity and cancer. (*Journal, American Medical Association*, June 27.)

Dr. Little, whose research, also with mice, has been done at the Roscoe B. Jackson Memorial Laboratory, Bar Harbor, Maine, contends that he has disproved Dr. Slye's hypothesis that the incidence of all spontaneous cancer is due to a single mendelian recessive hereditary factor.

There have recently come to maturity in Dr. Little's laboratory female mice that are first generation hybrids between cancer and "non-cancer" strains. A large number of cases of cancer have been developed among these first generation hybrids.

The amount of cancer of the breast appearing among virgin female mice of the first hybrid generation is largely dependent on the strain from which the female ancestor is derived, Dr. Little finds. If a "high" strain female is crossed with a "low" strain male the incidence of breast cancer in the virgin female hybrids is approximately 39 per cent. On the other hand, when a "low" strain female is crossed with a "high" strain male the incidence of cancer of the breast is only 6 per cent.

This difference holds good for the second hybrid generation, the research shows.

Dr. Little states that this type of inheritance is non-mendelian. It follows the maternal line and definitely establishes the existence of genetic influences outside the chromosomes.

"The accepted method of making human matings militates against the practical use of controlled heredity as a means of reducing the incidence of cancer in man," the scientist says in conclusion. "This, however, does not prevent the genetic approach to the problem in the laboratory and the use of controlled homogeneous inbred strains of mice from being extremely favorable material for pure scientific research in the nature and cause of cancer."

Dr. Little is managing director and editor of the American Society for the Control of Cancer.

*Science News Letter*, July 4, 1936

SAFETY ENGINEERING

# Paying Airline Passenger Safer Than Auto Occupant

## Railroads Take First Place in Passenger-Miles Per Passenger Death, But Drop to Third on Other Rating

By ROBERT D. POTTER

**D**ID you ever peer out of your family car to see an airliner rushing by far overhead? And did you think:

"I'm glad I'm safe here in my car instead of 8,000 feet up?"

The thought may have been comforting at the moment but, in reality, the paying passengers on that airliner—and all scheduled airline travel—were safer in 1935 than the drivers of America's motor cars. Only railroad passengers were safer.

Yes, riding in an airplane as a paying passenger on a scheduled flight last year was safer than riding in your own automobile!

If you are reading this you, naturally, were not killed last year by a motor vehicle accident but many other people were; more than 36,000 altogether and some 20,000 of them automobile occupants.

Here are the death figures for airline travel, motor vehicles and railroad transportation for 1935:

The foreign and domestic airlines of the United States traveled 360,559,431 passenger miles and killed 15 passengers. The result is 24,037,290 passenger miles per passenger fatality.

The motor vehicles of America traveled 379,979,800,000 occupant miles and killed 20,070 occupants; and thus traveled 18,932,725 occupant miles per occupant fatality.

### Only 18 Killed

The nation's railroad trains last year traveled 18,500,000,000 passenger miles and killed 18 passengers. The result is 1,027,780,000 passenger miles per passenger fatality.

A passenger or occupant mile, it should be explained, is one passenger or one occupant carried one mile.

The railroads with a century of experience behind them and all manner of safety checks and controls not available or practical for automobiles and aircraft may be expected to show—as they do—a superiority in safety to passenger travel. The surprising thing to many

people will be the discovery that scheduled airplane travel was safer, last year, than was motoring.

It is one thing to present figures on automobile, airline and railroad deaths for a given unit of mileage traveled and something else to go behind the figures and see how they were determined.

For the airlines, through the Bureau of Air Commerce, and the railroads, through the Interstate Commerce Commission, the figures are known with considerable accuracy. The weakest point in any comparative analysis of the three modes of transportation is the data concerning motor vehicles.

### Questions For Study

Some of the questions which may be pondered over include:

1. What mileage did America's motor vehicles travel in 1935?

2. How was that total mileage distributed between motor trucks and private passenger cars?

3. How is the mileage distributed between city and rural driving with their completely different driving conditions and different accident figures?

4. What is the number of miles to a gallon of gasoline which can be assumed for the average motor car on the road today? And the average truck also?

5. How does the number of miles per gallon of gasoline vary between city and country driving?

One agency which makes estimates of the yearly motor vehicle mileage is the Petroleum Economics Division of the U. S. Bureau of Mines which has prepared elaborate charts based on studies of the yearly gasoline consumption. This is the source of information used in the present article.

In 1935, the Petroleum Economics Division estimates, America's motor vehicles traveled 204,245,000,000 miles. This total figure can be broken down into rural and city travel and into truck and private car travel. Rural travel was 100,420,000,000 miles, split two ways: 85,960,000,000 miles for passenger cars and 14,460,000,000 miles for trucks. City travel amounted to 103,825,000,-

000 miles; 86,607,000,000 miles for private cars and 17,218,000,000 miles for trucks.

From these figures there can be computed the number of occupant miles traveled in motor vehicles by estimating the average occupancy of trucks and private cars. The National Safety Council uses two persons as the average number of occupants of a private motor car and 1.1 persons as the average number of occupants of each truck.

Multiplying the mileage totals by the occupancy, the 1935 occupancy mileage totals are:

	Occupant Miles
For rural highways. . .	187,826,000,000
For city driving. . . . .	192,153,800,000
Total . . . . .	379,979,800,000

Now for the death figures. In 1935 some 36,100 persons were killed by motor vehicles, but since here only the death rate for car occupants is wanted, one must subtract the 16,030 pedestrian deaths. Thus 20,070 occupants of motor vehicles lost their lives last year.

Divide the total motor vehicle occupant miles by the 20,070 deaths and one has the figure already given: 18,932,725 occupant miles for each occupant death.

Because of the widely different conditions of motor vehicle operation in city and country it is fairest to the motor car and truck death picture to break it into two parts: rural and city driving and deaths.

Of the motor vehicle death total of 36,100 persons in 1935, some 14,770 of them lost their lives in cities and towns and 21,330 in rural sections. The following table splits these deaths into rural and city and also pedestrian and motor vehicle occupant:

	1935	City	Rural
Total Deaths. . . . .	14,770	21,330	
Pedestrian Deaths. . .	10,010	6,020	
Occupant Deaths. . .	4,760	15,310	

### Occupant Deaths

Concentrate on the occupant deaths only. And recall that the occupant mileage for city travel is 192,153,800,000 miles and for rural travel it is 187,826,000,000 miles.

Divide city travel by city occupant deaths and rural travel by rural occupant deaths and you have:

	Miles
Rural occupant miles per occupant deaths. . . . .	12,268,000
City occupant miles per occupant death. . . . .	40,368,000

Scheduled airline travel, remember,

came out to 24,037,290 passenger miles per passenger fatality.

In any comparison between airplane, the motor car and the railroad train as a means of transportation two aspects must be separated:

(1) The safety of the device for the occupants using it, and

(2) The efficiency of the transportation device—a sociological efficiency as it might be called—in terms of the number of all persons killed for a given travel unit; say 1,000,000 miles.

### Efficiency for Death

The two points are quite distinct and require separate treatment. The figures already cited refer, of course, only to the first problem. Consider now the efficiency aspects of the airplane, motor car and railroad train as instruments of death.

Motor cars and trucks have the worst record on the basis of passenger miles covered per passenger death. But highway transport is the most efficient and safe method of transport if the transportation death problem is looked at in another way: A greater number of miles is traveled by autos and trucks for each fatality caused than by airplanes and railroad trains.

Note the following for the number of miles traveled for fatal accident of any kind whatever:

Railroads—375,000 miles per death.  
Airlines—1,200,000 miles per death.  
Automobiles—5,658,000 miles per death.

### Order Reversed

The order, it will be seen, is completely reversed from the passenger mile analysis with the airlines still holding the center position in both cases.

The railroads are, therefore, very safe for their paying passengers, for although 18 passengers were killed last year, not one of them was killed in a wreck or collision. These accidents occurred to persons jumping on moving trains, from car to car, and so on. But, in over-all deaths, the railroads present the reverse picture. In addition to the 18 fatally injured passengers some 555 employees were also killed. And 1680 other people were killed.

These figures, from the Bureau of Railroad Economics, must be divided into the total train miles traveled last year: 845,000,000 miles. The result is 375,000 miles per fatality.

For the airlines, a total of 34,811,105 flight miles was traveled last year, according to the Bureau of Air Commerce.

While only fifteen passengers were killed the total deaths from this form of transport was 29, including pilots, hostesses and ground personnel. Thus, commercial aviation killed one person for each 1,200,000 miles traveled.

Motor vehicles traveled 204,245,000 miles last year, according to estimates based on gasoline consumption and prepared by the Petroleum Economics Division of the U. S. Bureau of Mines. The automobiles and trucks of America last year killed 36,100 people. Dividing these two figures, one into the other, yields the answer: 5,658,000 miles of travel per fatal accident.

Another way of looking at the killing efficiency of the railroads, airlines, and motor vehicles is, perhaps, a bit fairer to the railroads. It consists of finding the number of passenger miles per death of any kind.

### The Figures

The figures with which one works to compute this are given below:

For railroads: 2,253 deaths in 1935 for 18,500,000,000 passenger miles.

For airlines: 29 deaths to 360,559,431 passenger miles, and

For motor vehicles: 36,100 deaths to 379,979,800,000 passenger miles.

The result is:

	Passenger Miles For Each Death
Railroads .....	8,210,000
Airlines .....	12,430,000
Motor Vehicles .....	10,520,000

The whole problem of speed and deaths in transportation raises the question of why men like to go from place to place more quickly and continually invent devices for accomplishing this purpose. Bluntly the question may be asked, "What is the good of all the present-day speed?"

### Time is Life

Dr. H. C. Dickinson of the National Bureau of Standards in Washington has made an unusual analysis of this problem which is confirmed, in part, by the figures above.

Time, says Dr. Dickinson, is the common heritage of all men. It is the only thing which all people have to do with as they will. A large amount of time is used in getting from one place to another for pleasure or business. In primitive days, by walking, a person's lifetime was probably equivalent to about 200,000 miles. If a man spent his life-



### SAFETY ABOVE

*The motorist may congratulate himself that he is on the ground, but he is actually travelling in greater danger than is the air line passenger. On railroads, it is the employee, not the passenger, who may be in danger. Photograph by Fremont Davis, Science Service Staff photographer.*

time traveling on horseback or in a horse-drawn carriage he might travel 500,000 miles in his entire life.

Man invented, however, the motor car, the airplane, and the railroad train to enable him to travel farther and faster; and in the process some people are killed just as people occasionally are killed in walking or by riding horseback.

"Compare the wasting of an entire life in covering from 250,000 to 500,000 miles by primitive modes of transportation," urges Dr. Dickinson, "with the life cost of modern travel by automobile where we sacrifice what is left of someone's life for each 10,000,000 passenger miles traveled."

Dr. Dickinson's point is that life is more efficient if we have motor cars and airplanes and railroad trains which kill people occasionally than it is to spend whole lifetimes figuratively crawling from place to place with less loss of life.

The reason why man wants faster airplanes, trains and automobiles is that

mass consciousness has a dim but inexpressible realization that the faster way is the more efficient way.

Says Dr. Dickinson:

"We use the automobile not only because we like it but because it saves time, which is life. It enables us to do more in a lifetime, to enjoy more leisure, to produce more of what we want, to 'save part of our lives.' Suppose now that some one proposes to reduce the average speed of automobile travel. If we reduce the average speed so that we cover 250,000 miles less out of each 10 million miles traveled before for each fatality, we shall have lost as much distance as would have been covered in a lifetime of walking. This would represent a reduction of only 2.5 per cent in the average speed of travel. If we did this and thereby saved every single highway fatality, it would be a questionable investment in life saving. But a reduction of 2.5 or 5 per cent in average speed certainly would save very few lives, possibly none at all."

*Science News Letter, July 4, 1936*

#### PHYSICS

## Tiny Transparent Balloons Probe Stratosphere Secrets

See Front Cover

**S**HIMMERING bags of transparent material of the kind used in wrapping cigarette packages are the latest tools of science to tap stratosphere secrets. Soaring to altitudes of 20 miles, these small unmanned balloons are being used to pierce the atmospheric heights far above where men can probe them with giant balloons carrying loads of equipment and human pilots. A vastly wider usefulness to science, research at only a fraction of the former cost, and complete freedom from any possibilities of loss of life are the three motives behind the gleaming balloons now being sent aloft which, through robot scientists in their "gondolas," record and send back to earth the reports from near the "surface" of the sea of air which surrounds the planet earth.

### Climbed 100,000 Feet

At the National Bureau of Standards in Washington, D. C., Dr. L. F. Curtiss has sent up such a balloon to an estimated height of over 100,000 feet. From such a height one could look down on the famed Explorer II as it

broke the world's altitude record, 72,395 feet, as would the climbers of Mt. Everest on the ground 29,000 feet below.

And at the Franklin Institute's Bartol Research Foundation, Dr. Thomas H. Johnson is sending up similar balloons in studies with which it is hoped to close the last gaps in the mystery of science that has been the cosmic ray.

### Low Cost

The cost? Comparatively trivial when viewed in relation to the variously estimated cost of \$185,000 spent on the two flights of the National Geographic Society-U. S. Army Air Corps' Explorer I and II.

Dr. Johnson, for example, estimated \$25 as the outside cost of the recent ascension from Swarthmore College campus shown in the accompanying photographs. And that figure includes the cost of the tiny shortwave radio transmitter which served as the robot mechanism to send back to his laboratory the stratosphere information.

Considering economics alone, some future gigantic world-wide stratosphere research might send up simultaneously, from over seven thousand spots in the

world, these midget balloons for the price paid for the Explorer I-II flights.

Key mechanism in the new midget balloons is the tiny broadcasting set which sends back, at regular intervals, the information being recorded on the scientific instruments. The sending set used by Dr. Curtiss of the National Bureau of Standards consists of only two radio tubes with electric power supplied by an ordinary dry cell battery like those used to operate a doorbell. Its total weight is only a few pounds.

In the Bartol Research equipment of Dr. Johnson there is also apparatus which dumps a total of ten pounds of sand ballast wherever the upward ascent of the balloon stops.

### Weather Men Pioneered

Pioneer explorers of the upper air were the weather men who have ever sought to learn new facts about what is happening high over the earth. To study air currents they first sent up small free balloons and watched them through telescopes. Or they sent up large kites with wind-speed recording mechanisms. Today, with the new system of weather forecasting known as air-mass analysis, daily airplane flights are made at many stations throughout the country to probe the temperature, pressure and velocities of upper air winds.

But the quest for higher altitudes and more information has brought in the newer radio balloons. Twenty-mile ascensions have been achieved and in U. S. S. R., where such research has been especially active, a record of 26 miles altitude has been reported. All the while, the robot radio operator aboard the balloon sent back its messages.

### For Cosmic Ray Research

It is in the field of cosmic ray research that scientists have great hopes for the radio balloon technique. That is the motive behind Dr. Johnson's preliminary Bartol Research ascensions.

A whole new region of the stratosphere can thus be studied, it is believed. Scattered measurements made with tiny balloons bearing automatic recording cosmic ray instruments have already been made in years past. The apparatus of Prof. Robert A. Millikan, California Institute of Technology, was typical. The balloons, with their instruments, were sent aloft in Texas with a note attached asking the finder to return the equipment and collect a small reward. Most times the equipment came back, but sometimes it was lost.

### To Attack Wilderness

Especially was the method feasible only in fairly well-populated regions of the earth where the chances of finding the balloon, after its descent, were reasonable. The use of the method in the regions near the magnetic poles of the earth—in far northwestern Canada and in the Antarctic—was impractical and yet those regions hold some of the most pertinent secrets of high altitude cosmic rays research.

Trying to learn sufficient facts about cosmic rays to build a really complete theory of their origin is handicapped because the observation must be made on an earth which is, in part, guarded from the rays. Not only does the air itself stop some of the cosmic rays and decrease their energy in an amount equal to a foot of lead, but, more important, the magnetic field of the earth bends the electrical particles in the rays and in some cases prevents them from reaching the surface of the earth at all.

CONSERVATION

## Sciences Put Heads Together Over Flood Control Problems

**F**LOOD control problems motivated a three-cornered scientific get-together at the summer meeting of the Ecological Society of America, at Rochester, N. Y., where three lines of scientific activity—forestry, soil conservation, and engineering—pooled ideas and suggested ways and means for combating the national menace of great waters broken loose.

Participants in the symposium were Ferdinand Silcox, chief of the U. S. Forest Service, Dr. W. C. Lowdermilk, associate chief of the Soil Conservation Service, and Dr. Morris L. Cooke, head of the Rural Electrification Administration.

### "Eyes unto the Hills"

The speakers were unanimous in the opinion that flood problems in the great stream valleys can not be met wholly on the spot, but that the ultimate effective efforts must be put forth far upstream, where the "little waters" are.

To achieve flood control, said Mr. Silcox, we must "lift up our eyes unto the hills;" in them lies the danger, and from them must come the help. For there our little waters rise; there man may restore and protect that vegetative cover which forms nature's own great

Near the magnetic equator, for example, only the most piercing high-energy rays of all can get through to the instruments of scientists. Farther north and south from the equator more and more of the so-called "softer" or weaker rays can be observed. And at the magnetic poles of the earth very weak rays should be observed at not-too-great altitudes.

Thus the hope of scientists to study cosmic rays near the magnetic poles is like a man who seeks to pierce the weakest point in the "armor" which guards the earth. The magnetic pole regions are the Achilles' heel areas in cosmic ray study.

But no one is going to transport large \$185,000 balloons far north into Canada where the chance of landing successfully and without injury to human pilots or apparatus is extremely minute. Robot radio balloons appear to be the only way out.

*Science News Letter, July 4, 1936*



### SAVED BY DEFECT

*This early Greek sculpture, which paradoxically survived 2400 years because it was thrown away, has come to adorn the Boston Museum of Fine Arts. Finding his marble imperfect, the Greek sculptor apparently abandoned the head unfinished; and in its obscurity the head escaped serious ravages of war and time.*

### Lessons from Raindrops

From single falling raindrops man can learn the beginnings of wisdom regarding soil conservation, Dr. Lowdermilk told his audience. When a drop falls, it splashes into a spray of clear water if it strikes a leaf or grassblade or anything else than bare, unprotected earth. The spray settles upon the soil and is absorbed, with little or no surface runoff.

But if the drop falls on bare earth, it splashes up not clean but muddy. The fine particles in the muddy spray, as it falls back to earth, "filter out at the surface to form a thin film which chokes up the surface pores of the soil. Only a part of the drop goes into the soil, another part flows over the surface, and by the accumulation of infinite drops, superficial flow is formed. As streamlets enlarge, the waters are released from surface frictional forces; the velocity of flow rapidly accelerates and generates erosive power. The rampant waters become gully-washers, to coalesce into raging torrential flows."

Another thing that prevents the soil from absorbing its proper quota of water is the presence of imprisoned air. In the aggregate these air bubbles im-

prison tremendous quantities of soil and keep it dry, when plenty of water is available. Roots, stems of plants, and other organic objects act as innumerable air-shafts to let this trapped air escape and permit down-soaking water to seep in behind it. Very little attention has as yet been paid to this function of roots and stems, said Dr. Lowdermilk, and a great deal of careful study is therefore needed to understand it and take practical advantage of it.

### Upstream Engineering Needed

Engineers no less than biologists and earth scientists must look upstream, declared Dr. Cooke, himself an engineer. Largely because of immediate business demands, but partly through lack of vision, engineers have always concentrated on enormous works on the big waters and they have let the little waters go unheeded and untamed. This policy, quite understandable but none the less dangerous, has contributed to historic flood disasters. Engineers have frantically thrown up higher and higher levees—and the great rivers have eventually met and broken all their challenges.

Now engineers are realizing more and more the necessity of taming the little waters before they become too great to tame. Engineering begins to look upstream.

### Business for Health

Such widespread attack on the origins of the problem that masters all human effort if permitted to concentrate in the great valleys must involve a different economic outlook from that which has always governed engineers and their private employers, Dr. Cooke pointed out. Businessmen say they are "not in business for their health," and they are justified in saying so. But the community at large is not in business for anything else but its health, and for this reason intangible values must be taken into account when the cost of a given large-scale project in control engineering is being reckoned. Engineers must become accustomed to looking out over a terrain that is nation-wide, and to seeing things in the large. Piecemeal engineering is doomed to be beaten piecemeal by the unbridled forces of nature. But engineering conceived and executed in regional and national terms has a chance to conquer.

*Science News Letter, July 4, 1936*

Half a million acres of Arkansas land have been added to the Ozark National Forest.



### America's Own

**T**ODAY is the day when, according to the tradition of the Fathers of this Republic, the American eagle screams his proudest. The bald eagle, chosen by our early statesmen to be our national crest, is a truly noble-appearing bird, with his stern, piercing eye glancing out from a pure white head. For the term "bald" is a puzzling misnomer; the only explanation that can be guessed is that it is due to these snowy feathers, a feature unique among eagles. The bald eagle's tail also is white, but the rest of the body and the wings are clothed with feathers so dark brown that they are sometimes said to be black.

Another eagle found in America, which has by inadvertence replaced the bald eagle on at least one American coin, the half-dollar, is the golden eagle. He is an even larger bird than the bald eagle, for his wing-spread averages seven feet or more, and the spread of the bald eagle is a little less than this, as a rule. This eagle also is brown, but his tail is white-and-black instead of all white, and the feathers on the back of his head and neck have a yellowish tinge, which accounts for his name. The outstanding mark of distinction between the two species, however, is the "trousered" leg of the golden eagle, as contrasted with the total absence of feathers on the shank of the bald. Only the young of the bald eagle have these leg-feathers, and this sometimes causes juvenile bald eagles to be mistaken for the golden species.

Since we have settled upon an eagle to be our own bird, it is perhaps more appropriate for us to take the bald eagle, since it is strictly American in its habitat, whereas the golden eagle is known from Europe and Asia as well as from this continent.

*Science News Letter, July 4, 1936*

### ECOLOGY

## Shade of Trees Measures "Ripeness" of Timber

**W**HETHER a stand of timber is "ripe" enough for cutting can be judged by measuring the degree of shade the treetops cast, W. G. Morris of the Society of American Foresters indicated before the meeting of the Ecological Society of America, at Seattle.

The method is very simple. The forester walks through the forest, carrying in his hand a pocket-size electric photometer, of the type used by photographers to gauge the light they have to work by. This shows the amount of sky light passing through the forest canopy, in terms of figures on a dial. From time to time he notes down the readings, and at the end of his trip he averages them up. The density of the forest canopy thus measured is an expression of the maturity and harvest-readiness of the forest.

### They Don't Like It Hot

Desert-dwelling reptiles are no fonder of the hot sun than are any other cold-blooded animals. The old-time notion that rattlesnakes and Gila monsters like to bask on a hot rock—the hotter the better—was shattered by Dr. Walter Mosauer, University of Southern California zoologist.

"Diurnal lizards and nocturnal snakes alike are killed by a short exposure to desert sunlight," he said, "especially if they are placed on the sand which reaches temperatures of 70 degrees Centigrade and over, around noon during the spring months. But even if they are suspended freely five feet above the ground, the direct insolation alone is lethal."

### Northwest Forests Mapped

Forests of the states of Oregon and Washington, among the most important of surviving American timber stands, have been accurately mapped by the U. S. Forest Service, and the maps are now being lithographed by the U. S. Geological Survey. This work, important both scientifically and economically, was outlined before the meeting by T. T. Munger of the U. S. Forest Service.

Twenty-six distinct types of forest are to be represented on the finished map, each type shown in a distinctive color. Logged-over and burned-over areas will also be shown.

*Science News Letter, July 4, 1936*

California oranges now reach Alaska five days after picking.

GENERAL SCIENCE

# Research Needs Freedom, Says National Academy Head

SCIENTIFIC research must have freedom of action, and it should also be given liberal support by both Government and industry, declared Dr. Frank R. Lillie, president of the National Academy of Sciences, before the semi-centennial meeting of the Society of Sigma Xi. Discussing specifically biological research, Dr. Lillie called attention to its numerous practical applications in agriculture and industry, but stressed the necessity for fundamental investigations without too pressing demands for immediate "usefulness" of every discovery.

He said, in part:

"Professions and industries and Government agencies can hardly be expected to pursue a purely rationalistic course within the confines of their own organizations. The untrammelled universities are the great homes of original scientific discovery. Hence the industries and the Government would be well advised to support their independence and freedom liberally. There is a tendency on the part of these agencies, and also on the part of great foundations, to offer support for specified investigations, only of presumed promise. Too much of this may cripple freedom of inquiry.

## "Business of Science"

"We hear much about the 'business of science' nowadays, meaning generally its utility as a social agency, and of the duty of scientists to be socially minded. Consciousness of this duty is growing and should develop still more. But society itself should recognize that the root of science is imagination and devotion to abstract truth; that, so long as the root lives, there is promise of new fruitage; and if it dies the promise is lost. The root must be watered with

undying courage and persistence and fertilized with a passion for accuracy. Thus arises the creative scientist. The best investment in science today is in able, free, creative individuals. Society can well afford to support them liberally with full freedom."

## Universities Best

Universities are the best homes for scientific research, because they can be most free from both narrow-minded "practical business" control and handicaps of political change. University men are most nearly free not only to follow that kind of research that is expressed in long-range dollars-and-cents values, but the even more important type of scientific adventuring that carries them into the realms of fundamental ideas, sometimes changing the whole philosophical and social outlook of a people. This was the thesis of an address by Dr. Karl T. Compton, president of the Massachusetts Institute of Technology, presented at the same meeting.

While hailing the contributions to both material and intellectual progress made by men in research laboratories supported by the more far-sighted kind of business leader, Dr. Compton was unsparing in his censure of the self-styled "hard-headed, practical business man," terming him "a man without vision, imagination or enthusiasm for new things; a man who scoffs at theory or a college degree; a man whose sole criterion of proper practice is that which he has been accustomed to in the past . . . The withering policies of such men have driven many a flourishing business into obsolescence."

Similarly, he paid his stinging respects to remote control by financial managers who see everything through an accountant's eyes, and will not look more than a month or a year ahead at that. Another obstacle to scientific progress seen by Dr. Compton is government regulatory activities for the stated objective of protecting the public, which sometimes "boomerang" disastrously because politically chosen leaders lack the scientific and technical qualifications indispensable to correct policy decisions.

Dr. Compton made a plea to his audience, composed mainly of highly trained scientists, for greater activity in placing

their results before the public in understandable form. He said:

"I am convinced also, on the basis of experience in the last few years, that there is tremendous room for effective missionary work for science in convincing the public, and particularly the leaders of the public, of the values of scientific work. In some cases this conviction can be made by argument, but in general it is likely to come only through the sympathetic interest of the public and this means a great program of mass action . . . The scientist has just as great an obligation to maintain friendly and understanding relations with the public as he has to operate with skill and devotion in his laboratory."

*Science News Letter, July 4, 1936*

MEDICINE

## Persistent Hoarseness Is Early Sign of Cancer

PERSISTENT hoarseness calls for careful examination by a trained throat specialist, warns Dr. Leo Schwartz (*Preventive Medicine*, June). He calls hoarseness the "herald symptom" of cancer of the larynx and points out that it is also the symptom of 49 other conditions, none of them trivial. Cancer of the larynx gives its warning sign earlier and remains localized longer than cancer anywhere else in the body, and early diagnosis and treatment offer a better chance for recovery than in other cancers. In the early stage this condition can be relieved by an operation which does not deprive the patient of his voice or necessitate the use of an artificial voice box.

*Science News Letter, July 4, 1936*

Two-story houses with windows were built in Palestine 4,000 years before Christ.

## THE IDENTITY THEORY By Blamey Stevens

"Young man, go west." Young scientist, investigate the Identity Theory before you decide where you should look for new regions to explore. This theory opens up limitless possibilities of progress not before guessed at; it makes all present knowledge of physical science as clear as crystal, so that you can see beyond into the future of your dreams.

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## ● RADIO

July 7, 2:15 p.m., E.S.T.

SAFETY FIRST IN SUMMER EATING  
—Miss Melva Bakkie, nutrition consultant of the American Red Cross.

July 14, 2:15 p.m., E.S.T.

UNPOPULAR WEATHER—J. B. Kincer of the United States Weather Bureau.

In the Science Service series of radio discussions led by Watson Davis, Director, over the Columbia Broadcasting System.

# •First Glances at New Books

## Anatomy

**ATLAS OF HUMAN ANATOMY**—Jesse F. Williams, Colored Illus. by Franz Frohse, Max Brödel and Leon Schlossberg—*Barnes & Noble*, 64 p., Paper bound, \$1.25, Cloth bound, \$2. Beautifully illustrated, compact in size and concise of text is this atlas intended for both anatomy students and laymen. The layman will not be familiar with all the anatomical terms used in labelling the charts, but brief text descriptions bring out essential features and a little study will enable him to gain a clear conception of his own body from head to toe and from skin to internal organs.

*Science News Letter, July 4, 1936*

## Plastic Surgery

**NEW FACES—NEW FUTURES**—Maxwell Maltz—*Richard R. Smith*, 315 p., \$3. A non-technical description of plastic surgery, illustrated with before-and-after pictures, with a chapter warning against quack "beauty doctors."

*Science News Letter, July 4, 1936*

## Archaeological Research

**THE ANNUAL OF THE AMERICAN SCHOOLS OF ORIENTAL RESEARCH**, Vol. XV, for 1934-1935—Ed. by Millar Burrows and E. A. Speiser—*Amer. Schools of Oriental Research*, 202 p., \$2.50. This volume is devoted entirely to Dr. Nelson Glueck's report of recent explorations in Eastern Palestine. The region traversed was mainly Edom, and the expedition added notably to knowledge of the history, economics, trade and civilization of the Edomites. Sketch maps and numerous illustrations of pottery sherds are provided.

*Science News Letter, July 4, 1936*

## Political Science

**WHOSE CONSTITUTION: An Inquiry Into the General Welfare**—Henry A. Wallace—*Reynal and Hitchcock*, 336 p., \$1.75. In this more than a document of a campaign year, the Secretary of Agriculture digs into the history and trends of constitutional government since the stirring days of 1787. Pointed with New Deal experiences, the inquiry is reasoned and historically oriented. Scientists will be interested in Secretary Wallace's view that "the illusion of the all-sufficiency of scientific invention and unlimited progress is now being demonstrated" and that a newer and less dogmatic science is beginning to undermine the older science, making the United States ripe for a more adequate and

fundamental philosophy. His chapter on "Machinery and General Welfare" asking whether technology and machinery can be made the servants of man rather than harsh taskmasters is also extremely pertinent.

*Science News Letter, July 4, 1936*

## History of Science

**AMERICAN MARTYRS TO SCIENCE THROUGH THE ROENTGEN RAYS**—Percy Brown—*Charles C. Thomas*, 276 p., \$3.50. The inspiring, tragic lives of the early American pioneers in X-ray work are briefly and skillfully portrayed to make a stirring tale, not only of sacrifice but of high courage, enthusiasm and devotion to science and humanity. A glossary of scientific terms and an introductory general chapter on X-rays and their discovery and effects add to the ease with which the layman will read the book.

*Science News Letter, July 4, 1936*

## Anthropology

**ALIEN AMERICANS**—B. Schrieke—*Viking Press*, 208 p., \$2.50. A Dutch anthropologist familiar with race problems in the Orient was invited to study Negro life in the United States by the Julius Rosenwald Fund. This book tells his observations and conclusions, not only about the Negroes of the South, but also regarding Chinese, Japanese, Mexicans, Indians, and newly-arrived immigrants, in various sections. Prejudice is a recurring theme in what he found. He makes suggestions which he believes would make for progress.

*Science News Letter, July 4, 1936*

## Archaeology

**EPIPHANIUS' TREATISE ON WEIGHTS AND MEASURES; THE SYRIAC VERSION**—Ed. by James Elmer Dean—*Univ. of Chicago Press*, 145 p., \$2.50. English translation of a fourth century text written by one of the ultra-conservative Greek fathers of the Christian Church. The treatise dealt with Biblical weights and measures, and was, in fact, a brief introduction to the Bible which wandered off into extensive discussion of this one topic. The treatise was much quoted in medieval times, and later.

*Science News Letter, July 4, 1936*

## Anthropology

**THE HERITAGE OF THE BOUNTY**—Harry L. Shapiro—*Simon and Schuster*, 329 p., \$3. Pitcairn Island is famous and unique, with its population descended from Tahitian women and mutineers of the *Bounty*. Obviously, such an isle offers anthropologists a rare chance to learn effects of racial mixture and inbreeding. In this instance, Dr. Shapiro concludes that no physical deterioration has occurred, unless account must be taken of dental defects which are prevalent. The *Bounty* has been a popular theme for writers, but Dr. Shapiro brings Pitcairn Island up to date, stressing the scientific interpretations, and he tells the story with unusual effectiveness and charm.

*Science News Letter, July 4, 1936*

## Astronomy

**HOW TO TELL TIME BY THE STARS, FOR AMATEURS**—C. J. White—*New Year's Best*, 12 p., 25c. A booklet which should afford the amateur astronomer a good deal of amusement—and even prove useful on a dark night if your watch has stopped.

*Science News Letter, July 4, 1936*

## Geology

**LES PROBLÈMES DE LA GÉOLOGIE ET DE LA GÉOCHIMIE DE L'HÉLIUM**—W. Belousoff—*Hermann & Cie, Paris*, 38 p., 10 fr.

*Science News Letter, July 4, 1936*

## Plant Physiology

**LABORATORY PLANT PHYSIOLOGY**—Bernard S. Meyer and Donald B. Anderson—*Edwards Bros.*, 107 p., \$1.75. Laboratory manual for a thorough-going course in general plant physiology, with line illustrations of apparatus and setups.

*Science News Letter, July 4, 1936*

## Geology

**LES FLAGELLÉS FOSSILES**—Georges Deflandre—*Hermann & Cie, Paris*, 98 p., 20 fr.

*Science News Letter, July 4, 1936*

## Petrography

**PÉTROGRAPHIE ET RAYON X**—B. Brajnikov—*Hermann & Cie, Paris*, 39 p., 12 fr.

*Science News Letter, July 4, 1936*

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